UNIVERSITAT DE BARCELONA

Grau d'Estudis Anglesos

Treball de Fi de Grau

Academic Year: 2019-2020

Coordinator: Elsa Tragant Mestres de la Torre (G4)

LANGUAGE DISORDERS IN ALZHEIMER'S DISEASE

STUDENT: Laura Martínez Carrizosa

TUTOR: Dra. Emilia Castaño Castaño

Barcelona, 11th June 2020

UNIVERSITAT DE BARCELONA

Coordinació d'Estudis
Facultat de Filologia

Gran Via
de les Corts Catalanes, 585
08007 Barcelona

Tel. +34 934 035 594
fil-coord@ub.edu
www.ub.edu

Declaració d'autoria

Amb aquest escrit declaro que sóc l'autor/autora original d'aquest treball i que no he emprat per a la seva elaboració cap altra font, incloses fonts d'Internet i altres mitjans electrònics, a part de les indicades. En el treball he assenyalat com a tals totes les citacions, literals o de contingut, que procedeixen d'altres obres. Tinc coneixement que d'altra manera, i segons el que s'indica a l'article 18, del capítol 5 de les Normes reguladores de l'avaluació i de la qualificació dels aprenentatges de la UB, l'avaluació comporta la qualificació de "Suspens".

Barcelona, a 11 Juny 2020

Signatura:

ABSTRACT: This paper is a study on the most common language disorders associated with Alzheimer's Disease (henceforth AD). While the first part provides a general overview of its cognitive and linguistic effects, the second part is aimed at analysing the impact of AD in language production, as reflected in a corpus of texts obtained from an online blog written by a person diagnosed with the disease. The results obtained from the analysis of the corpus (formed by a sample of 20 posts) confirm the tendency of AD patients to omit closed-class words and overuse semantically empty words. The corpus also reveals difficulties in the use of the appropriate verb tenses. These results are consistent with the literature that examines semantic impairment caused by the loss of semantic representations. As a conclusion, it is possible to observe that the loss of semantic representations also affects written language, causing a simplification of the patient's discourse.
Keywords: Alzheimer's disease, language disorders, semantic impairment, written output

RESUMEN: Este es un estudio sobre la Enfermedad de Alzheimer (EA) centrado en los trastornos en la producción de lenguaje asociados a la enfermedad. Mientras que la primera parte del proyecto ofrece una visión general sobre la enfermedad, la segunda parte presenta un análisis del lenguaje escrito producido por una paciente, obtenido de un blog online. Los resultados obtenidos tras analizar el corpus (formado por un total de veinte entradas) muestran una clara tendencia por parte de la paciente a la omisión de palabras de clase cerrada, al uso de palabras vacías de significado y al uso excesivo del tiempo verbal presente. El análisis, por lo tanto, muestra un funcionamiento irregular a nivel semántico a causa de la pérdida de representaciones semánticas. Por ello, es posible observar que la pérdida de contenido semántico también está presente en el lenguaje escrito y, en consecuencia, el discurso producido por la paciente es un discurso simplificado.
Palabras clave: Enfermedad de Alzheimer, trastornos lingüísticos, deterioro semántico, expresión escrita

TABLE OF CONTENTS

1. INTRODUCTION

Whenever Alzheimer's Disease is mentioned, the first idea that comes to mind is that it is a very isolating disease because of how it impairs patients' memory and, as a consequence, their ability to both remember and make new memories. Patients, unaware of their surroundings and unable to remember their loved ones, become completely isolated from the world. However, as opposed to what is commonly thought, the isolating characteristics of the disease derive from the damage that it causes to other cognitive processes, which difficult patients' ability to live a normal life. Language disorders are the second most common effect caused by Alzheimer's Disease.

This paper, therefore, provides an overview of the disease and of how it affects patients' cognitive and motor skills, but it focuses on the language disorders that arise from AD. The explanation of AD language disorders will be based on the evidence provided by different studies (based on task performance). This section will cover the main aspects of language affected by AD, such as semantics, syntax or naming.

Once a general description of the effects caused by the disease has been put forward, this paper will present an analysis of a sample of written output produced by a patient that has been suffering from Alzheimer's Disease for several years. This analysis focuses on the patient's performance on an unsupervised task (writing an online blog). The aim of this analysis is to put into practice the knowledge obtained in the first section of the paper and to compare the information presented on the literature review section with a real case of Alzheimer's.

2. REVIEW OF THE LITERATURE

2.1. Alzheimer's Disease – Definition

In 2019, the World Health Organization estimated that around 50 million people suffer from Alzheimer's Disease (henceforth AD). As this number increases in 10 million every year, it is estimated that in 2050 there will be around 152 million cases of AD around the world. Only in Europe, an average of 1,55% of the population suffers from this disease; this translates into 818,346 cases in Spain (Alzheimer's Europe, 2013). The severity of AD resides on the fact that it is a neurodegenerative and incurable disease, affecting, mainly, memory and language, but also other cognitive and motor skills (Mandell & Green, 2011). Therefore, patients suffering from AD are unable to normally carry out their daily practices.

AD is often confused with Dementia Syndrome because both are defined as affecting normal brain function. However, they are not the same disease, but, instead, one of them (Alzheimer's) is the cause of the other (Dementia). Firstly, Dementia Syndrome is an umbrella term, that is, a term used to label a set of different acquired cognitive impairments that affect the cerebral cortex as a consequence of different neurodegenerative diseases. Therefore, it is very difficult to provide a fully encompassing definition of what dementia is, for there are many impairments labelled under this term. The key aspects of dementia to take into consideration are that it is acquired and that it causes neurodegenerative deterioration in, at least, three of the following cognitive domains: language skills, short- and long-term memory, personality or behaviour, visuospatial skills and manipulation of acquired knowledge (including executive functions) (Grabowski & Damasio, 2004). Therefore, what is most characteristic of dementia is that, because it affects several intellectual domains simultaneously, it is impossible for patients to live a normal life. It is worth mentioning that the impairment of just one of the cognitive faculties previously mentioned does not imply the presence of dementia but, instead, isolated diseases such as amnesia or aphasia.

As an acquired cognitive impairment, dementia can be caused by several factors such as brain injuries, alcohol and drug abuse, vascular disorders or neurodegenerative diseases. However, the most severe cases of dementia are caused by degenerative neurological diseases, such as Huntington's or Parkinson's diseases. However, Alzheimer's disease (a type of neurodegenerative disease) is the most frequent cause of

dementia. According to the World Health Organization (2019), it is estimated that around 55 – 70% cases of dementia are caused by Alzheimer's disease.

First described by Alois Alzheimer in 1907 after the death of Auguste Deter (one of his patients and the first person to be diagnosed with this disease), nowadays Alzheimer's disease is considered to be the first cause of cortical dementia, that is, a type of dementia characterised by "multi-focal cortical damage" (Mandell & Green, 2011, p.18).

The most characteristic aspect of AD is, probably, its late clinical onset. Although there are some sporadic cases with an early onset, AD mainly affects people over 65, which means that age is a key risk factor. Once it manifests, the neurological degeneration caused by the disease progresses without remission over 10 to 20 years. Therefore, once the disease starts affecting the patient, there is no possible remission, although the possibility of controlling the degeneration that it causes is under study.

Though in most cases it is not hereditary, in some cases having a family history of AD is a recognised risk factor for developing AD (mainly early onset AD). This has led to think, therefore, that there is a dominant gene by which AD can be inherited (Mandell & Green, 2011).

Being a type of cortical dementia, Alzheimer's disease affects, mostly, the cerebral cortex (the outer layer of the brain), by modifying its tissue. The most characteristic changes caused in the cerebral cortex are the accumulation of extracellular amyloid plaques and the presence of intracellular neurofibrillary tangles. The term amyloid refers to protein fragments that, in the case of a healthy brain, are usually eliminated. However, in the case of a brain affected by AD, beta amyloid (Aβ) toxic fragments are accumulated into hard plaques, which damage neuronal synapses and, later on, kill neurons and disrupt neuronal networks (Mandell & Green, 2011). Furthermore, neurofibrillary tangles (NFT), fibrillary hyperphosphorylated tau protein aggregates, which can also be found in other neurodegenerative diseases, are found in AD patients. However, the NFT present in AD are characteristic due to their paired helical structure. According to, Mandell and Green (2011), neurofibrillary tangles may have a key role in neuronal death. Nonetheless, it is not clear whether NFT are caused because of the excessive production and accumulation of Aβ (amyloid hypothesis) or, on the contrary,

the accumulation of Aβ is a sign of normal aging and the formation of NFT is the key event leading to the pathology.

Nevertheless, these are not the only changes affecting the cerebral cortex, for the brain also becomes atrophic in specific areas (especially those involved in memory and cognition), which implies a severe neuronal loss.

2.2. Cognitive effects caused by Alzheimer's disease

2.2.1. Memory dysfunction

As mentioned above, Alzheimer's Disease affects the normal functioning of cognitive and behavioural processes; that is, AD impairs memory, but also affects executive functions, emotions, behaviour and even visuospatial skills. It is important to take into consideration the fact that the isolated presence of one of these impairments does not warrant an AD diagnosis. Instead, it is the combination of these effects that implies that a patient is suffering from the disease.

The hallmark for AD is the early decline of memory function. In order to understand the effects of AD on memory, it is important to understand what memory and its functions are. Budson (2011) defines memory as a "collection of mental abilities that use different systems and components within the brain to retain information over time" (p. 315). This means that, through different memory systems, the brain processes stimuli received from the outside, processes them and retains information for short or long terms in order to use it over time. The recalling of this information can be unconscious (implicit memory), such as walking or talking, or conscious (explicit memory), such as remembering a phone number (Budson, 2011).

The memory system most affected by AD is episodic memory, the deterioration of which follows Ribon's law (Budson, 2011); that is, the patient shows dysfunction in learning new information (anterograde amnesia) and in recalling recently learned information (retrograde amnesia), while the ability to recall remote memories is usually preserved. As a consequence, patients will show a repetitive behaviour (such as repeatedly ask the same questions or tell the same stories). AD may also have more severe consequences for episodic memory, such as having false or distorted memories. Thus, a

patient may have a memory of something that has not happened or may confuse one person for another, among other dysfunctions (Budson, 2011).

Furthermore, working memory and its different components are also severely impaired by AD. Impairment of the working memory system implies a difficulty in "temporarily maintaining and processing information [i.e., in short-term]" (Budson, 2011, p.328). The effects of AD on both episodic and working memory makes difficult for patients to perform tasks such as paying attention or completing a task that requires following different steps.

Lastly, AD impairs the semantic memory system. Patients will find difficulties when trying to retrieve the name of an item or even when trying to comprehend written language. This dysfunction at the language level will be thoroughly explained on section 2.3.

Therefore, as shown above, AD mainly affects explicit memory systems, that is, those that are consciously declared. However, although conscious learning is impaired, it is worth mentioning that unconscious and automatic skills are considered to be preserved when patients have episodic memory deficits (Budson, 2011).

2.2.2. Behaviour and emotion

Although AD is characterised by the severe damage on memory systems, patients' behaviour and emotions are also affected by the disease.

Emotions are the human responses to external stimuli. Because AD patients progressively lose all understanding of the external world, as the disease progresses emotional dysfunctions such as psychotic episodes, depression (20-40% of the patients), delusions (30-50%), agitation (40-80%) and apathy (50-90%) may also appear (Wright, 2011). Other disturbances may include aggressiveness, anxiety or irritability (Stern et al., 2011).

Stern et al. (2011) also list among the effects of this disease a stage of anosognosia in which patients lose all awareness of the self. That is, patients are not aware of the behavioural changes that they are undergoing, which is very dangerous for their own safety. Therefore, AD patients become isolated from the outside world but also, somehow, from themselves; they are not able to process external stimuli but they are also

not able to be aware of themselves either. That is why Alzheimer's Disease is such an isolating disease.

2.3. Linguistic effects caused by Alzheimer's disease

AD is a neurodegenerative disease, characterised by the impairment of episodic memory at an early stage. Another core marker of AD is language impairment (specifically, semantic memory deficit). Language deficits in AD patients are considered to be a consequence of the impairment of semantic and working memory along with the impossibility to retain new memories (Altmann & McClung, 2008).

Language is the capacity that characterises us as human beings. It allows us to communicate to one another through the (rule-governed) combination of the arbitrary acoustic symbols that form our language. Having the capacity to produce and comprehend language requires the involvement of highly interactive cognitive processes, which are progressively impaired by AD (Reilly et al., 2011).

The key components of language that are most widely studied in relation to language effects of AD are: phonology, semantics, naming, syntax and narrative discourse.

2.3.1. Phonology

Phonology is the ability to discriminate the different acoustic elements of a particular language (phonemes), which is acquired very early in life.

Although the empirical literature on the effects of AD on this language component yields mixed results, the dominant view on phonology is that both phonological processing and phonetic articulation abilities are well preserved during the early stages of AD and it is not affected until the late stages of the disease, when the patient progressively enters a muted stage (Altmann & McClung, 2008; Reilly et al., 2011; Taler & Pillips, 2008). This is thought to be due to the automatic characteristic of phonological access (Altmann & McClung, 2008) for, as it has been mentioned previously, what is mostly affected during the early stages is episodic memory (short-term), which means that more automatic processes are preserved.

However, Reilly et al. (2011) questioned this dominant view by putting forward different theories based on research, which question the fact that phonology remains intact through the early stages of the disease. For example, they mention a study carried out by Cuetos et al. (2003) in which it was observed that AD patients produced more pseudoword errors, word initial errors and phonemic substitution errors than controls. Croot et al. (2000) also contradicted the dominant view on phonological abilities being buffered from AD until late stages on the disease by carrying out a study on 10 AD patients. They analysed the patients' "conversational speech, single-word production and series speech" (Croot et al., 2000, p. 297). According to the results obtained, patients produced phonological paraphasias, false-start errors and hesitant speech. These results led them to conclude that it is probable that less typical cases of AD may suffer from damage on some aspects of speech production, such as phonological encoding (proved by the presence of false-start errors and phonological paraphasias), articulation, and access to phonological forms from semantics (for example, in tasks such as picture naming) among others (Croot et al., 2000).

2.3.2. Semantics

As mentioned above, the impairment of working and semantic memory also damages the ability of patients to produce and comprehend language (Altmann & McClung, 2008). It is important to explain how semantic representations are stored in the human brain in order to understand how AD affects semantic features.

The formation of semantic representations depends on two processes that are "neuroanatomically dissociable" (Reilly et al., 2011, p.340): *content* and *process*. Consider the semantic representation of a concrete concept, such as "dog". Our semantic representation of this concept is formed by different semantic features (the basic units of meaning) stored in our brain, such as "friendly" or "furry", among others. This storage of semantic features is the *content* element. In order to form a semantic representation of a concept, the different semantic features are categorised and bound together into a cohesive concept. The categorisation of different features is, therefore, the *process* element of the formation of semantic representations.

Therefore, semantic features (which may come from different sensory modalities) could be considered to function in a similar way to that of neurons: connections between

features are created once they are activated at the same time and, the more frequently these connections are activated, the stronger they become. These connections are affected by AD in a way similar to the connections between neurons. Altmann & McClung (2008) argue, in connection with the process of decay that semantic representations undergo, that AD "attacks" the connections between semantic features, which causes the loss of semantic representations. However, not all connections are lost at the same time because some connections are stronger than others (for they are used more frequently). Moreover, not all component features are used as much as others. Some features are present on the representation of many words (i.e., they are shared features) such as "has ears", "has eyes" or "has fur". These features and their connections are stronger because they are frequently categorised. However, other features are only used to differentiate between elements of the same category (i.e., distinguishing features), thus having weaker connections. Distinguishing features, therefore, are likely to be lost earlier than shared features, and if connections are lost, features will also be lost. Thus, both process and content are affected by AD.

This impairment at the feature level implies consequences at both the verbal and non-verbal levels, though the verbal level is the domain most widely affected by AD. The loss of distinguishing features leads to semantic paraphasias; that is, the discourse produced by the patients is fairly fluent, but they may encounter difficulties in naming an item or, most frequently, they will "average" coordinate concepts (Reilly et al., 2011, p.342). As distinguishing features are lost, semantic representations become more average towards a prototype. This means that patients will produce coordinate errors, for example, saying "cat" instead of "dog". These errors may become more severe as the disease progresses, in which case patients will end up using superordinate terms ("animal" for "dog"). Thus, patients suffering from AD will produce a more ambiguous speech than the healthy-aging elderly.

2.3.3. Naming

Naming requires the engagement of the phonological, lexical and semantic levels of processing. Because it demands the "healthy" functioning of different systems of processing, it is most likely to become impaired in AD. Deficits at the semantic level along with working-memory impairments are mainly responsible for the limitations that

patients encounter when trying to produce language both at word and sentence level. However, since this deterioration in cognitive functions is a result of the loss of neuronal connections, its linguistic effects are likely to vary as a function of the process that neuronal damage has on every patient (Perez Mantero, 2012)

When producing language (either a single word or a complete sentence), AD patients will show deficits such as anomia: a word-finding difficulty that evidences AD patients' difficulties in trying to retrieve a word.

Several studies mention the presence of naming errors (i.e., anomia) in preclinical AD, which is known as Mild Cognitive Impairment (henceforth MCI) (Gallant et at., 2019; Taler & Phillips, 2014). MCI represents a half-way stage between a healthy individual and one affected by dementia. Although MCI does not always evolve into dementia, it is a risk factor for developing a type of dementia. Therefore, anomia has a very early onset in AD, for it is probable that it appears during the MCI stage. Other alterations on the patients' discourse, such as incomplete or incoherent sentences and repetitions have also been observed during preclinical AD (Perez Mantero, 2012).

Reilly et al. (2011) argue that, although naming requires the involvement of the phonological, lexical and semantic levels of processing, naming deficits are mostly derived from semantic impairments. Because AD impairs the connections between semantic features, it contributes to blocking the access to semantic representations and hinders the possibility of choosing the correct word. As a result, the range of vocabulary of the patients is severely reduced because of the difficulties that they experience when trying to access their lexical storage.

Because of this reduction of vocabulary and the difficulty in retrieving words, patients use different "strategies" (which may change throughout the various stages of the disease) in order to put their message across. During the early stages of the disease, patients rely on the use of empty words (such as "thing", "place" or "it") or words that are closely related but not precisely synonyms (such as saying "bicycle" instead of "motorcycle"). Paraphasias are present from early stages and become more frequent as the disease progresses. Furthermore, Perez Mantero (2012) argues that during the early stages of the disease, because patients are aware of their deficits, they are likely to use circumlocution (i.e., describing the element instead of naming it), either to "mask" their deficits or because it provides better communicative results. As mentioned on the

previous section on semantic deficits, patients on more advanced stage of the disease also manifest coordinate and superordinate errors (i.e., using the term of the category such as "animal" instead of "giraffe"). These get more severe on the final stages of the disease, in which patients abandon the use of semantically related words and produce empty words or incomprehensible neologisms, until they finally stop answering any petition to name any object or person (Perez Mantero, 2012).

Thus, as mentioned above, semantic paraphasias, and later on, superordinate errors are among the most frequent naming errors (Altmann & McClung, 2008). Nonetheless, there is not consensus on how naming is specifically impaired in AD. The problem resides on the, sometimes contradictory, results obtained in different tasks performed by AD individuals: for example, while naming appears to be preserved in tasks such as word-picture matching, patients present difficulties in tasks such as picture naming. Altmann & McClung (2008) considered several studies which had obtained contradictory results in order to provide an explanation for why naming appeared to be impaired only in some studies. The explanation that they provide is that different results will be obtained depending on the tasks that individuals are asked to perform. That is, naming performance may appear to be fairly intact on less demanding tasks (such word-picture matching tasks). However, when performing more demanding tasks (such as picture naming tasks), the results obtained will probably show more naming errors, for these tasks cannot be performed through automatic processes but require a "controlled search through memory" (Altmann & McClung, 2008, 23). Therefore, the diagnosis of impairment is apparently dependent on the tasks used to test the patient's naming skills.

2.3.4. Syntax

Measuring the level of impact that AD has on syntax is quite complex. It is commonly acknowledged that AD patients present agrammatism, that is, a language deficit that affects syntactic complexity. Generally, there is a decline in sentence length, grammatical complexity (reduction in the use of function words and bound morphemes), propositional content (that is, reduction of the ideas, normally a verb and its arguments, expressed per utterance), verbal fluency (the ability to produce as many words from a specific category as possible in the required time) and difficulty in the comprehending of noncanonical sentences (that is, those that do not follow the structure subject plus predicate), such as

passive sentences (Lyons et al., 1994; Reilly et al., 2011). However, the conflict resides on whether this is due to an impairment at the syntactic level or it is a consequence of impairments at other levels of language processing.

A study carried out by Lyons et al. (1994) analysed oral language samples by very mild and mild Alzheimer's patients. According to the results obtained, AD individuals produced syntactically simpler and shorter sentence (or sentence fragments) but, nonetheless, non-agrammatic. That is, individuals' oral language presented a correct word order, respected subject-verb agreement and verbs presented the correct aspect, tense and modality. This decline in length and complexity, however, was not attributed exclusively to working-memory impairments but to a general cognitive decline associated with the disease.

Furthermore, Kemper et al. (1993) analysed written language samples on 368 adults affected by dementia. It was observed that, as AD became more severe, written output was reduced. There was a significant decline in the number of propositions, sentence length and in the use of main and secondary verbs and conjunctions. In this study, the absence of subordinate clauses and the decline in clause length was attributed to working memory deficits, whereas the decline in the number of propositions per sentence was associated with patients' general cognitive decline.

It could be concluded, therefore, that (both in oral and written output) language is simplified as AD becomes more severe, but also that, nonetheless, the discourse is grammatically well formed. Therefore, syntax becomes simpler but not agrammatic.

2.3.5. Narrative discourse

All the studies reviewed on the previous sections studied language performance at the word or sentence level. However, "real" communication is a highly demanding task, for patients are not required to produce a word or a sentence but to sequence events, convey meaningful content and be able to maintain a cohesive thread throughout the whole discourse (Reilly et al., 2011). Therefore, narrative discourse requires planning as well as episodic and working memory resources (in charge of recalling remote information), which are allegedly affected by AD from an early stage.

According to Altmann & McClung (2008) spontaneous speech in mild and moderate AD is fairly preserved (for, as it has been explained, syntax and phonology are not highly affected), although information content is notably reduced.

However, further research is still required, since studies to date show mixed results and no clear explanation has been provided for these heterogeneous results yet. For example, Altmann & McClung (2008) found that mild and moderate individual with AD produced errors related to open class words (such as nouns or verbs) and pronouns, but also related to closed class words (such as determiners) as well as morphosyntax (such as verb tenses). However, similar errors were not found in the case Hebrew speakers (Kavé & Levy, 2003) who showed preserved agreement and tense markers. The question is whether this is due to differences in the method used to carry out the different studies or to cross-linguistic structural differences.

Therefore, the dominant view is that patients' spontaneous speech is fairly fluent. However, some limitations are perceived in the content of their discourse, which shows difficulties related to the use of both closed and open class words as well as morphosyntax, particularly, agreement and also omission of pronouns and determiners. Nonetheless, studies performed on patients who spoke other languages (such as Hebrew) provide contradictory results. Further research is needed to provide a clear explanation for such variations.

These differences, however, could be due to the progressive characteristic of the disease; the presence of different narrative dysfunctions could be a result of the patients being on different stages of the disease (Pérez Mantero, J. L., 2012). During the initial stage of the disease (which tends to last from two to five years), the most observed deficit is anomia in terms of difficulties in retrieving the correct word. As a result, the discourse of the patients becomes slightly imprecise. The initial stage progresses to the moderate stage (which usually lasts from three to five years) in which the previous difficulties caused by anomia become more severe, to the point that patients' discourse abounds in "neologisms" (i.e., creating their own jargon). Moreover, syntactic structures tend to become simpler and shorter, though grammatical. It is also frequent for patients to use pronouns without previously mentioning the referent, which has a negative impact on discourse cohesion. Therefore, at this stage discourse becomes simpler, incoherent and empty of meaning. As the disease progresses, the patient enters the advanced stage (which can last for an indeterminate period of time), in which the patients' discourse is severely

affected because of the critical dysfunction of several cognitive skills. The patient enters an apathic stage, which influences both language production and comprehension. Patients do not show any initiative in producing language and, when doing so, their discourse shows phonological paraphasias (error of word-selection at the phonemic level), echolalia (the involuntary repetition of a word/phrase that the patient has just heard) and glossomania (language production that lacks communicative value). Overall, in the advanced stage discourse is rare and difficult to understand for the interlocutor. Finally, the patient enters a muted stage (Pérez Mantero, J. L., 2012).

3. BLOG ANALYSIS

Most of the studies mentioned in the previous section report the results obtained in controlled, supervised tasks, such as picture-naming or word-picture tasks, among others. As a result, many of these studies argue that the results obtained could be conditioned by the task chosen to perform on the patients. Furthermore, these studies focus on oral language evaluation. However, this section is devoted to the analysis of written language performance during an unsupervised activity – writing a blog. The aim of this analysis is to explore whether it is possible to detect language deficits in AD unsupervised written discourse.

The main objective of this analysis is to put into practice the knowledge obtained from the studies previously reviewed by analysing a sample of authentic data and to compare and contrast that information with the results yielded by my analysis.

3.1. Methodology

3.1.1. Material

The material selected for the analysis is an online blog, which has been written since 2014 by a patient suffering from Alzheimer's Disease. This blog in particular is a very reliable resource for studying written language performance since the posts are not revised or corrected by another person. Therefore, the content of the blog has not been altered in any respects.

Furthermore, because the blog has been written consistently since 2014 it is possible to have an insight into how written language performance might have been affected by the disease.

3.1.2. Analysis

In order to carry out the analysis, a corpus of blog entries, which included the 20 most recent posts, was compiled. However, some posts (especially some of the ones posted during March-April 2020) were excluded from the analysis because they reproduced content from other websites, which made it impossible to analyse authentic language performance on the part of the patient. Therefore, the final selection includes twenty blog

posts, which cover the period May 2019 – April 2020. On the following sections, each post is referred to with a number between 1 and 20, on the basis of their publication date; post number 1 is the oldest and number 20 the most recent one.

Each post is analysed individually before assembling an overview of the most frequently repeated linguistic phenomena. The focus of the analysis is on the patient's use of vocabulary (and the possible simplification of it). Anomia (i.e., word-finding difficulty) is one of the most common disorders caused by AD, in some cases even present from pre-clinical stages. Thus, the analysis pays close attention to the vocabulary used by the patient and the type of "strategies" that she applies to compensate for lexical deficits; that is, the potential use of superordinate terms, circumlocution or empty words, among others. Furthermore, the use of function words (e.g., pronouns and determiners) is also analysed, for both the overuse and/or the absence of function words influence the overall coherence of the text.

Therefore, this is an analysis of the lexical problems experienced by a patient suffering from Alzheimer's Disease. Although there are specific criteria (based on the literature review section) for the linguistic features to be analysed, this study also pays attention to other language deficits not previously mentioned and that might be encountered during the analysis.

3.2. Results

Overall, the patient presents a more simplified use of language than expected for a healthy person of her age. This negatively impacts the understanding of the text, which is sometimes difficulted by the chaotic structure of the post. It is possible to observe sudden changes of topic, sentence fragments (or abusive use of the ellipsis or "etc." to finish the sentence), repetition of sentence or even paragraphs, among others. However, the errors that most repeatedly appear have to do with vocabulary, the omission of function words (especially determiners and pronouns) and with verb tenses.

3.2.1. Use of vocabulary (naming errors)

The vocabulary of the patient is observably[1] more reduced than that of a healthy-aging person. The criteria for the analysis of the different blog posts was based on the different naming errors described in section 2.3.3.: use of superordinate terms, creation of neologisms, circumlocutions, frequent use of empty terms and semantic paraphasias. Therefore, this analysis looked for the presence of different naming errors in the patient's language.

After completing the analysis, the naming error that stands out the most is the constant use of empty words. That is the case of words such as "thing" and "task". Some examples of overuse of empty words are found in blog posts number 9 and number 20, in which the patient writes the sentences "our thermos keeps hot **things** hot" and "trained **tasks** to mitigate a person's dys-Abilities". In both cases it is possible to deduct the meaning of the empty word thanks to context; however, these are a sign of the patient experiencing word-retrieving difficulties.

It has also been possible to detect the use of superordinate terms. One of the most repeated is the use of "people", as in, for example, blog post number 6, where the patient repeatedly uses the word "people" to refer to her neighbours.

Furthermore, it has also been observed that, in some of the posts, the patient, unable to retrieve the appropriate word for the sentence, uses a word with a similar meaning, although not a synonym (i.e. semantic paraphasia). Examples are found in post number 8, in which the patient talks about how, when having a conversation, she has to try to understand the most important parts so that the interlocutors are satisfied with getting their point across. However, she writes "The other person is **comfortable** that they got their point across", which has a similar meaning, but is not a synonym.

Lastly, it is important to highlight an atypical naming error that has been observed in blog post number 20, in which the patient uses the word "awareness" correctly and, a few paragraphs later, the same word is used with a different meaning. The patient writes the sentence "[…] reliable back-up for **awareness** of whether they have been fed or not" and, two paragraphs later, she writes "roosters require constant **awareness**" meaning "attention".

[1] For a complete list of these naming errors, see Table 1.

On the other hand, no examples of creation of neologisms were found on this analysis.

3.2.2. Determiner use

The analysis[2] also shows an important tendency, on the part of the patient, to omit determiners. The patient repeatedly omits articles, possessives and demonstratives.

In order to calculate the rate of omission of determiners, it was required not only to count the number of times that the patient used the different determiners correctly but also to count the number of times that the patient omitted a determiner when the sentence required to include one. Then, once the total number of required determiners and the total numbers of determiners used was calculated, the following results were obtained.

The use of determiners (articles, possessives and demonstratives) was required in a total of 910 contexts. However, in 193 of those cases determiners were omitted, which represents a rate of omission of 21,21%. Of these 193 omissions, 151 were omissions of articles, which represents 78,24% of the total omissions. In 94 contexts the definite article "the" was omitted by the patient (48,7% of the article omissions) in sentences such as "the first part of [**the**] conversation" (post number 18) or "[**the**] folks were busy" (post number 2). Indefinite articles "a" and "an" were not used when required in 57 occasions (29,53% of the article omissions). This was observed in sentences such as "[the] first bit of [**a**] statement and [the] last bit of [**a**] statement" (post number 8).

Furthermore, possessives were omitted by the patient in 40 occasions, which represent a rate of 20,73% of omission. "My" was the most frequently omitted possessive (34 occasions). An example is found in post number 18 in the sentence "add [an] item to [**my**] calendar"

Lastly, the use of demonstratives ("this" and "that") could be considered to be correct in nearly all contexts; it was only in 2 contexts (1,04% of the cases) they were missing: "[**this**] blog" (post number 11) and "[**that**] night" (post number 15).

There were no contexts in which determiner overuse was noticed.

[2] For complete list of results see Table 2

Therefore, errors in the use of determiners were related to lack of use and not to overuse. Moreover, there was not presence of errors when using the correct determiner; in the majority of the cases the patient knew which determiner to use and, if there were any errors in selecting the determiner, it was not frequently enough as to include it in the analysis.

3.2.3. Pronoun use

The analysis[3] of pronoun use shows a clear tendency, on the part of the patient, to omission.

Since in most of the posts, the patient talks about herself, the use of the first person pronoun is much more frequent than any other pronoun. While the first person singular pronoun "I" was required a total of 371 times, other pronouns were required only occasionally. For example, the third person singular pronoun "she" was only required twice.

It is worth mentioning that, not only the first person singular pronoun "I" and the third person singular pronoun "it", but also the rest of pronouns were omitted when they appeared close to their referents (i.e., on a different clause but on the same sentence). That is, when a pronoun and its referent appeared in different sentences, the patient did not omit the pronoun. For example, on blog post number 2, the patient wrote the sentence "[...] [**I**] want to remind [**you**] that you are important", an example of how she omits the pronoun (in this case pronoun "you") when the referent is on immediate preceding clause.

When analysing the use of both personal pronouns "I" (omitted 18,33% of the time) and "it" (omitted 19,64% of time), it is noticed that the absence of these personal pronouns at the beginning of a sentence (or on the initial position of a subordinate clause) is constant across the posts that have been analysed. That is, the patient drops the subject "I" and "it" in both main and subordinate clauses. Some examples are found in "[**I**] picked up my cell phone" (post number 18), "[**I**] need to set up music" (post number 9) or "[**I**] gave up" (post number 3).

[3] See Table 3 for a complete analysis of pronoun use

Furthermore, in 9 different contexts, the patient omitted both the personal pronoun "I" and the auxiliary verbs "to be", "have" or "do". Moreover, the construction "it + to be" was omitted on four different contexts. Examples are found in "[**it is**] wonderful" (post number 6), "[**I have been**] having" (post number 17) or "[**I was**] recently asked" (post number 15).

On the contrary, only in 7 contexts there is evidence of pronoun overuse, that is, in 7 different contexts, the patient uses a pronoun without having mentioned its reference previously (the object pronoun "it" is overused in 4 of these contexts). For example, in blog post number 18, the patient talks about the difficulties that she experiences trying to remember what she is writing about. After that, the patient writes about something that she "started it" twice, despite the fact that she does not mention on the previous paragraphs what the pronoun "it" makes reference to. This overuse is also found in post number 3, in which the patient suddenly leaves a sentence unfinished and then writes a sentence beginning with "it is important!". This pronoun, therefore, does not have a previous referent, for the previous sentence was left unfinished.

3.2.4. Verb tenses

Although the use[4] of verb tenses was not part of the initial criteria of analysis, after analysing the corpus, it has been detected that the patient presents an unusual performance when selecting among the different verb tenses of English.

In fourteen out of 20 blog posts, the patient selects incorrectly the tense of some of the verbs used in the text. The phenomenon that is most frequently observed is the overuse of the present simple and present continuous tenses. More specifically, among the most frequent deviant uses of verb tenses are: the use of present simple instead of present perfect (detected on six different contexts), the use of present simple instead of past simple (detected on six different contexts) and the use of present continuous instead of present simple (detected on eight different contexts). For example, in blog post 16, the patient writes the sentence "This year [I] **thinking** I will make […]". Although the use of the present tense is required, the present continuous is used instead.

[4] See Table 4 for more details on the use of verb tenses

Another example is found in blog post number 18, in which the patient writes "Lately my concentration is […]". However, the adverb "lately" requires the patient to use a perfect tense (in this case "has been").

3.3.Discussion

The main objective of this analysis was to test whether it is possible to detect AD language disorders in unsupervised, non-time locked tasks. Although the analysis has not found an overwhelming number of examples of deviant language performance, the results are in line with findings put forward by the articles reviewed on the first section.

Overall, the patient presents a simplified discourse, which translates into repetitions of sentences (or fragments of a sentence), presence of unfinished sentences and sudden changes of topic, which agrees with Perez Mantero's findings (2012). However, taking into consideration that the patient is not in an initial stage of the disease, she does not present as many word-finding errors (i.e., anomia) as it could be expected, based on articles such as Gallant et al. (2019) or Taler & Phillips (2014). Although it was possible to detect examples of some of the most mentioned naming errors, other types of errors such as the use of neologisms were not detected. This could be explained by the fact that writing a blog is not an example of spontaneous language production. That is, when writing the blog, the patient can work on the blog post for as long as she deems necessary and, therefore, she can take her time to find the most appropriate word for the idea that she is trying to express. Nonetheless, although it has not been possible to detect a wide variety of examples, it has been proved that the patient does present difficulties at the semantic level through the localization of different contexts in which the patient, unable to find the correct word for an specific context, has to resort to words used on previous paragraphs even though the meaning is not the most appropriate. This has been found in examples such as on the repetitive use of the word "awareness" with different meanings in each use. This presence of semantic paraphasias along with the repetitive use of empty words "thing" and "tasks" agrees with some of the symptoms described by Reilly et al. (2011), which would confirm a possible semantic dysfunction and difficulty to access semantic representations.

Furthermore, the patient does present a dysfunction in the use of function words, especially determiners and pronouns. Perez Mantero (2012) mentions the possibility that

patients may overuse pronouns (i.e., use a pronoun without mentioning the referent) during an initial or moderate stage of the disease; however, this is not found in this corpus. A possible explanation for the correct use of pronouns and referents could be the same explanation as for the lack of anomia symptoms: the blog allows the patient to spend as long time as necessary to find the words and the referents that she needs to use in order to produce a cohesive text. However, in line with the article written by Altmann & McClung (2008), the texts do present an important number of contexts in which the patient omits both pronouns and determiners, which can sometimes affect the comprehension of the text. Altmann et al. (2001) explain the omission of closed-class words by means of the same model that justifies the loss of open-class words: the loss of distinctive features at the semantic level. In the case of closed-class words, every word has a unique meaning, hence every semantic representation consists of a set of distinguishing features. As semantic features are lost, patients do not have an alternative word with a similar meaning (e.g., a superordinate term); instead, no word is activated and, as a consequence, the word is omitted. Then, the omission of function words along with the presence of anomia suggest semantic impairment and the inability to access semantic representations due to the loss of both descriptive and distinguishing features.

Altmann et al. (2001) also suggest that a patient who experiences semantic impairment will show errors when inflecting open-class words, which was observed in the analysis on the use of verb tenses (section 2.2.4.). There is an observable overuse of the present simple and the present perfect tenses across the corpus. The patient constantly resorts to the present tense despite the fact that she may be referring to past events that have already happened. As a consequence, when the patient explains things that have happened to her recently, she expresses the ideas as if they were happening at the moment of writing and, therefore, the sentences are simplified. The incorrect use of verb tenses shows, therefore, an impossibility to use more complex structures in order to express complex ideas.

Therefore, the results suggest that the disease has affected the patient's ability to produce language at the semantic level. The constant omission of pronouns and determiners along with the overuse of empty words and present tenses leads to the assumption that the disease has affected semantic representations. Because of AD, the connections between semantic features are lost, which, as a consequence, causes the loss of access to semantic representations. However, due to the fact that some features are

categorised more frequently and, therefore, have stronger connections, some words are more likely to be present in AD speech (such as empty words or superordinates). On the other hand, closed-class words, which are semantically represented with more distinguishing features than shared features, are more prone to be lost, which, as a consequence, leads to the omission of those words.

4. CONCLUSION

Alzheimer's Disease can be concluded to be a highly isolating neurodegenerative disease because of its effects on different cognitive skills and memory, its most affected area. Furthermore, language is considered to be the second most affected area. AD patients undergo a process of degeneration that impairs their communicative skills. Among the most frequent linguistic deficits that AD patients suffer is anomia (word-finding difficulties), which results from the loss of connections between the features that create semantic representations (Altmann & McClung, 2008).

Moreover, the results yielded by the analysis of a corpus of blog posts suggest that semantic deficits spread beyond unplanned language use. This conclusion is supported by a deviant use of language that affects both open and closed-class words. In regard to open class-words, the results showed the use of superordinates and empty words (especially the overuse of "thing") along with the overuse of the present simple and the present continuous verb tenses. Moreover, the patient presented a clear tendency to closed-class word omission, especially pronouns and determiners.

Therefore, although the written production of language might vary from oral language production (mainly because writing a blog is not an spontaneous activity and allows the patient to revise her posts), the analysis carried out on the second section of this paper suggests that some of the effects of the disease (such as the impairment at the semantic level) can be observed both in written and oral output. Nonetheless, this does not translate into a loss of meaning of the text, for it is possible to understand what the patient is expressing despite having some function words missing or using the wrong verb tense. Overall, the patient is able to put her ideas forward.

Therefore, although written and oral language may present significant differences (mainly because writing a blog is an activity that allows patients to revise their posts and make corrections), the analysis carried out in the second section of this paper suggests that some of the effects of the disease (such as semantic deficits) can be observed both in written and oral discourse.

5. REFERENCES

Altmann, L. J. P., & Kempler, D., & Andersen, E. S. (2001). Speech Errors in Alzheirmer's Disease: Reevaluating Morphosyntactic Preservation. *Journal of Speech, Language, and Hearing Research, 49*(5), 1069 – 1082

Altmann, L. J. P., & McClung. J. S (2008). Effects of Semantic Impairment on Language Use in Alzheimer's Disease. *Seminars in Speech and Language, 29* (1), 18–31. doi: 10.1055/s-2008-1061622

Alzheimer Europe (2013, updated on 2017). *2013: The prevalence of dementia in Europe.* https://www.alzheimer-europe.org/Policy/Country-comparisons/2013-The-prevalence-of-dementia-in-Europe

Budson, A. E. (2011). Memory Dysfunction in Dementia. In A. E. Budson & N. K. Kowall (Eds.), *The Handbook of Alzheimer's Disease and Other Dementias* (First, pp. 315–335). Blackwell Publishing Ltd.

Croot, K., Hodges J. R., Xuereb, J., & Patterson, K. (2000). Phonological and Articulatory Impairment in Alzheimer's Disease: A Case Series. *Brain and Language, 75* (2), 277–309

Cuetos, F., Martinez, T., Martinez, C., Izura, C., & Ellis, A. W. (2003). Lexical processing in Spanish patients with probable Alzheimer's disease. *Cognitive Brain Research, 17* (3), 549–561.

Gallant, M., Lavoie, M., Hudon, C., & Monetta, L. (2019). Analysis of Naming Errors in Healthy Aging, Mild Cognitive Impairment, and Alzheimer's Disease. *Canadian Journal of Speech-Language Pathology and Audiology, 43*(2), 95–108.

Grabowski, T., & Damasio, A. (2004). Definition, clinical features and neuroanatomical basis of dementia. In M. Esiri, V. Lee, & J Trojanowski (Eds.), *The Neuropathology of Dementia* (pp. 1–33). Cambridge: Cambridge University Press. doi: 10.1017/CBO9780511526886.002

Kavé, G., and Levy, Y. (2003). Sensitivity to gender, person and tense inflection by persons with Alzheimer's disease. *Brain and Language, 87* (2), 267–277.

Kemper, S., LaBarge, E., Ferraro, F.R., Cheung, H., Cheung, H., & Storandt, M. (1993). On the preservation of syntax in Alzheimer's disease: Evidence from written sentences. *Archives of Neurology*, 50 (1), 81–86

Lyons, K., Kemper, S., Labarge, E., Ferraro, F. R., Balota, D., & Storandt, M. (1994). Oral language and Alzheimer's disease: A reduction in syntactic complexity. *Aging, Neuropsychology, and Cognition: A Journal on Normal and Dysfunctional Development, 1*(4), 271–281.

Mandell, A. M., & Green, R. C. (2011). Alzheimer's Disease. In A. E. Budson & N. K. Kowall (Eds.), *The Handbook of Alzheimer's Disease and Other Dementias* (First, pp. 21–110). Blackwell Publishing Ltd.

Perez Mantero, J. L. (2012). El déficit lingüístico en personas con demencia de tipo alzhéimer: breve estado de la cuestión. *Pragmalingüística 20*, 220–238

Reilly, J., Troche, J., & Grossman, M. (2011). Language Processing in Dementia. In A. E. Budson & N. K. Kowall (Eds.), *The Handbook of Alzheimer's Disease and Other Dementias* (First, pp. 354–386). Blackwell Publishing Ltd.

Stern, R. A., Andersen, S. L., & Gavett, B. E. (2011). Executive Functioning, In A. E. Budson & N. K. Kowall (Eds.), *The Handbook of Alzheimer's Disease and Other Dementias* (First, pp. 369–415). Blackwell Publishing Ltd.

Taller, V., & Phillips, N. A. (2008). Language performance in Alzheimer's disease and mild cognitive impairment: A comparative review. *Journal of Clinical and Experimental Neuropsychology*, *30*(5), 501–556. doi: 10.1080/13803390701550128

World Health Organisation (2019, September 19). *Dementia*. https://www.who.int/news-room/fact-sheets/detail/dementia

Wright, C. I. (2011). Emotion and Behaviour in Alzheimer's Disease and Other Dementias. In A. E. Budson & N. K. Kowall (Eds.), *The Handbook of Alzheimer's Disease and Other Dementias* (First, pp. 416–456). Blackwell Publishing Ltd.

6. APPENDIXES

6.1.Table 1 – Vocabulary

	SUPERORDINATE TERM	CIRCUMLOCUTION	EMPTY WORDS	SEMANTIC PARAPHASIA
1				
2				
3	*Return to the desk after* ***food*** meaning "eating".		*My various* ***tasks*** *Numerous Advocacy* ***tasks***	
4			*Do other* ***things***	***See*** *me on FaceBook* – meaning "find"
5	*People* meaning "neighbours"			
6	*People* meaning "patients"	*Journalism titles* meaning "headings"	*Pick up* ***something***	
7			*Certain* ***things***	
8			*A helpful* ***thing***	*The other person is* ***comfortable*** *that they got their point across* – meaning "satisfied" *More strategies will* ***show up*** *soon* meaning "discover"
9			*Hot* ***things***	
10	*Food* meaning "meals"		*His own* ***thing***	*Every week he* ***creates*** *the concentrated liquid for my protein – chocolate-coffee drink* – meaning "to prepare" ***Painful*** *body* - meaning "aching"
11			*Personal* ***things***	

12				
13			*These **things***	
14			*One of the **things** lost*	
15			*One **thing***	*Create strong avoidance* meaning “to impede”
16			*Two **things*** *Most **tasks***	
17			*Moving around in the house or in **tasks**.*	
18				
19				
20			*[…] that involves trained **tasks** to mitigate a person’s dys-Abilities*	*Awareness* meaning “attention”

6.2.Table 2 – Determiner Use

DETERMINERS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	TOTAL
TOTAL REQUIRED	36	56	88	16	28	98	50	56	65	57	16	29	37	29	65	21	7	50	16	90	**910**
OMITTED (%):	5,56	17,85	9	0	25	11,22	12	21,43	23,08	24,56	43,75	6.90	40,54	24,14	47,69	9,52	14,29	24	25	30	**21,21**
ARTICLES (%):		12,5	7,95		10,71	10,2	10	16,07	20	15,79	37,5	3,45	29,73	24,14	40	4,76	14,29	12	25	26,67	**78,24**
Definite article:		10,71	3,4		7,14	4,08	4	8,93	12,3	7,02	31,25	3,45	24,32	13,79	24,62	4,76	14,29	10	18,75	16,67	**48,7**
The		10,71	3,4		7,14	4,08	4	8,93	12,3	7,02	31,25		24,32	13,79	24,62	4,76	14,29	10	18,75	16,67	
Idefinite articles		1,79	4,54		3,57	6,12	6	7,14	7,7	8,77	6,25	3,45	5,41	10,35	15,38			2	6,25	10	**29,53**
A		1,79	3,4		3,57	3,06		5,36	7,37	5,26		3,45		3,45	7,69					10	18,65
An			1,14			3,06	6	1,78		3,51	6,25		5,41	6,9	7,69			2	6,25		10,88
POSSESIVE DETERMINERS (%):	5,56	5,35	1,14		14,29	1,02	2	5,36	3,08	8,77			8,11		7,69	4,76		12		3,33	**20,73**
My		5,35	1,14		14,29		2	5,36	3,08	8,77			8,11		6,15	4,76		12		1,11	17,62
Your															1,54					1,11	1,04
Its	2,78																				0,52
Our	2,78					1,02															1,04
Their																				1,11	0,52
DEMONSTRATIVE DETERMINERS (%)											6,25		2,7								**1,04**
This											6,25										0,52
That													2,7								0,52

6.3.Table 3 – Pronoun Use

PRONOUN USE		PERSONAL PRONOUNS								OBJECT PRONOUNS					
		I	You	He	She	It	We	You	They	Me	You	Him	Her	Them	It
1	TOTAL REQUIRED	**17**	**7**	**-**	**-**	**1**	**4**	**-**	**-**	**2**	**5**	**-**	**-**	**-**	**-**
	MISSING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	TOTAL REQUIRED	**42**	**4**	**-**	**-**	**6**	**2**	**-**	**5**	**4**	**1**	**-**	**-**	**-**	**3**
	MISSING	12	-	-	-	3	-	-	-	-	1	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	TOTAL REQUIRED	**56**	**-**	**-**	**-**	**6**	**-**	**-**	**2**	**2**	**-**	**-**	**3**	**3**	**4**
	MISSING	14	-	-	-	-	-	-	-	-	-	-	-	1	-
	USED WITHOUT A REFERENT	-	-	-	-	1	-	-	-	-	-	-	-	-	-
4	TOTAL REQUIRED	**4**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**
	MISSING	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	TOTAL REQUIRED	**13**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**-**
	MISSING	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	TOTAL REQUIRED	**13**	**4**	**-**	**-**	**6**	**4**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**1**
	MISSING	2	-	-	-	1	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	TOTAL REQUIRED	**4**	**3**	**-**	**-**	**2**	**8**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**
	MISSING	1	-	-	-	1	1	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	TOTAL REQUIRED	**15**	**-**	**3**	**-**	**6**	**-**	**-**	**1**	**5**	**-**	**-**	**-**	**-**	**1**
	MISSING	-	-	-	-	1	-	-	-	1	-	-	-	-	1
	USED WITHOUT A REFERENT	-	-	-	-	1	-	-	-	-	-	-	-	-	-
9	TOTAL REQUIRED	**20**	**-**	**-**	**-**	**4**	**4**	**-**	**-**	**3**	**-**	**-**	**-**	**1**	**-**
	MISSING	6	-	-	-	1	-	-	-	-	-	-	-	1	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PRONOUN USE		PERSONAL PRONOUNS								OBJECT PRONOUNS					
		I	You	He	She	It	We	You	They	Me	You	Him	Her	Them	It
10	TOTAL REQUIRED	**30**	**-**	**13**	**-**	**2**	**3**	**-**	**-**	**8**	**-**	**2**	**-**	**1**	**-**
	MISSING	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	TOTAL REQUIRED	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	MISSING	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	TOTAL REQUIRED	**20**	**6**	**-**	**-**	**3**	**-**	**-**	**-**	**4**	**-**	**-**	**-**	**-**	**-**
	MISSING	1	-	-	-	1	-	-	-	1	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	TOTAL REQUIRED	**12**	**-**	**-**	**-**	**5**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**6**
	MISSING	2	-	-	-	2	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	1
14	TOTAL REQUIRED	**13**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	MISSING	1	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	TOTAL REQUIRED	**28**	**-**	**-**	**-**	**5**	**10**	**-**	**4**	**12**	**-**	**2**	**-**	**3**	**3**
	MISSING	1	-	-	-	1	1	-	1	-	-	1	-	1	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	1	-
16	TOTAL REQUIRED	**12**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
	MISSING	3	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	TOTAL REQUIRED	**20**	**5**	**-**	**-**	**1**	**-**	**-**	**-**	**4**	**-**	**1**	**-**	**-**	**2**
	MISSING	7	-	-	-	-	-	-	-	-	-	-	-	-	1
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	TOTAL REQUIRED	**41**	**4**	**1**	**-**	**2**	**1**	**-**	**1**	**2**	**-**	**1**	**-**	**-**	**7**
	MISSING	13	-	-	-	-	-	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	3
19	TOTAL REQUIRED	**-**	**-**	**-**	**-**	**-**	**4**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
	MISSING	-	-	-	-	-	2	-	-	-	-	-	-	-	-
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-

20	TOTAL REQUIRED	**8**	**-**	**1**	**2**	**1**	**6**	**-**	**3**	**-**	**-**	**-**	**3**	**1**	**2**
	MISSING	-	-	-	-	-	-	-	1	-	-	-	-	-	1
	USED WITHOUT A REFERENT	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PRONOUN USE		**PERSONAL PRONOUNS**								**OBJECT PRONOUNS**					
		I	You	He	She	It	We	You	They	Me	You	Him	Her	Them	It
TOTAL	TOTAL REQUIRED	**371**	**33**	**18**	**2**	**56**	**47**	**1**	**19**	**54**	**7**	**7**	**6**	**10**	**29**
	MISSING	68	-	-	-	11	4	-	2	2	1	1	-	3	3
	MISSING (%)	18.33	-	-	-	19.64	8.51	-	10.53	3.7	14.29	14.29	-	30	10.34
	USED WITHOUT A REFERENT	-	-	-	-	2	-	-	-	-	-	-	-	1	4
	USED WITHOUT A REFERENT (%)	-	-	-	-	3.57	-	-	-	-	-	-	-	10	2.9

6.4.Table 4 – Verb Tenses

	PRES. SIMP > PRES. CONT.	**PRES. SIMP > PRES. PERF**	**PRES. SIMP > PAST SIMP.**	**PRES. CONT. > PRES. SIMP.**	**PRES. CONT > PRES. PERF**
1					
2				***Doing*** > Do	
3					
4					
5		***Bring*** > Brought ***Get*** > Got			
6		***Choose*** > Have chosen	***Emits*** > Emitted		
7	***Ask*** > Asking				
8			***Can*** > Could		***Becoming*** > Have become
9					
10			***Wash*** > Washed	***Allowing*** > Allows (x2) ***Doing*** > do	
11					
12					
13			***Cannot*** > Couldn't ***Am*** > Was Makes > Made	***Waking*** up > Wake up	
14		***Arrives*** > Has arrived			
15				***Receiving*** > Receive ***Experiencing*** > Experience	
16		***Are*** > Have Been		***Thinking*** > Think (x2)	
17					
18		***Is*** > Has been	***Have*** > Had		
19					
20	***Work*** > Working			***Scaring*** > Scare	